CLAIMS

We claim:

1. An automated method of removing embedding media from a biological sample on a microscope slide, the method comprising the steps of:

heating the biological sample and the embedding media above the melting point of the embedding media; and

rinsing with an immiscible fluid the heated embedding media from the biological sample.

2. The method of claim 1, wherein the step of rinsing includes rinsing the melted embedding media from the biological sample.

3. The method of claim 4, wherein the step of heating a bottom side of the slide includes heating the biological sample to temperatures ranging from ambient to 130 °C.

4. The method of claim 1, wherein the embedding media is paraffin.

5. The method of claim 1, wherein the fluid is a gas.

6. The method of claim 1, wherein the fluid is a liquid.

7. The method of claim 6, wherein the liquid is not an organic solvent.

8. The method of claim 6, wherein the liquid is selected from the group consisting of de-ionized water, citrate buffer (pH 6.0-8.0), Tris-HC1 buffer (pH 6-10), phosphate buffer (pH 6.0-8.0), SSC buffer, APK Wash™, acidic buffers or solutions (pH 1-6.9), and basic buffers or solutions (pH 7.1-14).

9. The method of claim 1, wherein the fluid includes ionic or non-ionic surfactants.

10. The method of claim 9, wherein the ionic or non-ionic surfactants are selected from the group consisting of Triton X-100, Tween, Brij, sodium dodecylsulfate and saponin.

11. The method of claim 1, wherein the fluid includes a detergent.

12. An automated method of removing paraffin from a paraffin-embedded biological sample on a microscope slide, the method comprising the steps of:

heating the paraffin-embedded biological sample; and

applying a paraffin-immiscible liquid on the biological sample.

13. The method of claim 12, wherein the liquid applied has a density which is greater than the liquified paraffin.

14. The method of claim 12, wherein the liquid does not solvate the paraffin.

15. The method of claim 12, wherein the liquid is selected from the group consisting of de-ionized water, citrate buffer (pH 6.0-8.0), Tris-HC1 buffer (pH 6-10), phosphate buffer (pH 6.0-8.0), SSC buffer, APK Wash™, acidic buffers or solutions (pH 1-6.9), and basic buffers or solutions (pH 7.1-14).

16. The method of claim 12, wherein the liquid includes ionic or non-ionic surfactants.

17. The method of claim 16, wherein the ionic or non-ionic surfactants are selected from the group consisting of Triton X-100, Tween, Brij, sodium dodecylsulfate and saponin.

18. The method of claim 12, wherein the liquid includes a detergent.

19. The method of claim 12, wherein the step of applying a liquid is performed during the step of heating the paraffin-embedded biological sample.

20. The method of claim 12, wherein the step of heating the paraffin-embedded biological sample includes the following steps:

heating the paraffin-embedded biological sample without liquid on the biological sample; and

heating the paraffin-embedded biological sample with liquid on the biological sample, whereby the step of heating the paraffin-embedded biological sample without liquid on the paraffin-embedded biological sample removes moisture between the paraffin-embedded biological sample and the surface of the slide.

21. The method of claim 20, wherein the step of heating the paraffin-embedded biological sample without liquid on the biological sample melts at least a portion of the paraffin.

22. The method of claim 20, wherein the liquid applied is more dense than the paraffin, and

wherein the step of heating the paraffin-embedded biological sample with liquid on the paraffin-embedded biological sample melts at least a portion of the paraffin and causes the paraffin to float to the top of the liquid.

23. The method of claim 12, wherein the heating of the biological sample and the paraffin melts at least a portion of the paraffin, and further comprising the step of applying a fluid to remove the at least a portion of the paraffin.

24. The method of claim 23, wherein the step of applying a fluid includes rinsing the melted paraffin from the paraffin-embedded biological sample with the fluid.

25. The method of claim 24, wherein the fluid is not an organic solvent.

26. An automated method of cell conditioning without the removal or etching of the paraffin within a biological staining procedure, the method comprising the steps of:

applying heat to the biological sample;

applying at least one conditioning reagent; and

applying fluid to remove the at least one conditioning reagent.

27. An automated method according to claim 26 wherein the biological sample is on a top surface of a slide; and

wherein the step of heating includes heating a bottom side of the slide.

28. An automated method according to claim 27 wherein the bottom side of the slide is in contact with a thermal platform and wherein the step of heating a bottom side of the slide includes heating the slide by conduction using the thermal platform.

29. An automated method according to claim 26 wherein the biological sample is heated to temperatures ranging from ambient to 130°C.

30. An automated method according to claim 26 wherein the at least one conditioning reagent is selected from the group consisting of air, de-ionized water, citrate buffer (pH 6.0-8.0), Tris-HCl buffer (pH 6-10), phosphate buffer (pH 6.0-8.0), SSC buffer, APK Wash™, acidic buffers or solutions (pH 1-6.9), and basic buffers or solutions (pH 7.1-14).

31. An automated method according to claim 26 wherein the at least one conditioning reagent contains ionic or non-ionic surfactants selected from the group consisting of Triton X-100, Tween, Brij, sodium dodecylsulfate and saponin.

32. An automated method of simultaneously removing embedding medium from a embedded biological sample while providing cell conditioning within a biological staining procedure, the method comprising the steps of:

applying exposing and cell conditioning reagents;

applying heat to the embedded biological sample;

applying fluid to remove the exposing and cell conditioning reagents; and

staining the biological sample.

33. An automated method according to claim 32 wherein the embedded biological sample is on a top surface of a slide; and

wherein the step of heating includes heating a bottom side of the slide.

34. An automated method according to claim 33 wherein the bottom side of the slide is in contact with a thermal platform and wherein the step of heating a bottom side of the slide includes heating the slide by conduction using the thermal platform.

35. An automated method according to claim 32 wherein the step of applying heat includes heating the biological sample to temperatures ranging from ambient to 130°C.

36. An automated method according to claim 32 wherein the exposing and cell conditioning reagents are selected from the group consisting of air, de-ionized water, citrate buffer (pH 6.0-8.0), Tris-HC1 buffer (pH 6-10), phosphate buffer (pH 6.0-8.0), SSC buffer, APK Wash™, acidic buffers or solutions (pH 1-6.9), and basic buffers or solutions (pH7.1-14).

37. An automated method according to claim 32 wherein the exposing and cell conditioning reagents contain ionic or non-ionic surfactants selected from the group consisting of Triton X-100, Tween, Brij, sodium dodecylsulfate and saponin.

38. An automated method of removing or etching embedding media from a embedded biological sample and subsequently providing cell conditioning within a biological staining procedure, the method comprising the steps of:

applying heat to the embedded biological sample;

applying a first fluid to the embedded biological sample to remove the embedding media or etching reagents;

applying cell conditioning reagents;

applying a second fluid to remove the cell conditioning reagents; and

staining of the biological sample.

39. An automated method according to claim 38 wherein the biological sample is on a top surface of a slide; and

wherein the step of heating includes heating a bottom side of the slide.

40. An automated method according to claim 39 wherein the bottom side of the slide is in contact with a thermal platform and wherein the step of heating a bottom side of the slide includes heating the slide by conduction using the thermal platform.

41. An automated method according to claim 38 wherein the step of applying heat includes heating the biological sample to temperatures ranging from ambient to 130°C.

42. An automated method according to claim 38 further comprising the step of applying exposing reagents to the biological sample

43. An automated method according to claim 42 wherein the exposing reagents are selected from the group consisting of air, de-ionized water, citrate buffer (pH 6.0-8.0), Tris-HC1 buffer (pH 6-10), phosphate buffer (pH 6.0-8.0), SSC buffer, APK Wash™, acidic buffers or solutions (pH 1-6.9), and basic buffers or solutions (pH7-1-14).

44. An automated method according to claim 42 wherein the exposing reagents contain ionic or non-ionic surfactants selected from the group consisting of Triton X-100, Tween, Brij, sodium dodecylsulfate and saponin.

45. A composition comprising a buffer, wherein the composition is selected from the group consisting of:

a) 2 x SSC;

b) 10 mM phosphate buffer with about 0 to about 0.1% Triton-X100;

c) deionized water having from about 0 to about 0.1% Triton-X100;

d) about 5 to about 50 mM sodium citrate buffer having about 0 to about 0.1% Triton-X100, and about 0 to about 0.5% sodium dodecyl sulfate (pH adjusted to between about 6 and about 8); and

e) about 5 to about 20 mM Tris buffer with about 0 to about 0.1% Triton-X100.

46. A composition comprising a buffer, wherein the composition is selected from the group consisting of:

a) about 5 to about 20 mM Tris-HCl, about 0 to about 40 mM boric acid, about 0 to about 2mM EDTA, about 0 to about 2 mM EDTA, about 0 to about 20% DMSO, about 0 to about 0.5% Brij 35, and about 0 to about 0.1% Triton X100, (pH adjusted from about 7 to about 9);

b) about 5 to about 50 mM Citrate buffer, from about 0 to about 0.5% SDS, about 0 to about 10% ethylene glycol, about 0 to about 1 M urea, about 0 to about 20% formamide, about 0 to about 10% DMSO, about 0 to about 0.5% Brij 35, and about 0 to about 0.1% Triton X100 (pH adjusted from about 6 to about 8);

c) about 1 to about 50mM EDTA, about 0 to about 0.75% SDS, about 0 to about 10% ethylene glycol (pH adjusted from about 7 to about 8);

d) about 10 mM sodium citrate, about 1.4 mM $MgCl_2$, and about 0.1% SDS (pH adjusted from about 7 to about 8);

e) about 10mM phosphate, and from about 0 to about 0.1% Triton X100 (pH adjusted from about 6 to about 8);

f) 2 X SSC; and

g) about 10 mM phosphate buffer, about 0 to about 10 mM sodium citrate, about 0 to about 5 X SSC, and from about 0 to about 2.5% Chondroiton A (pH adjusted from about 7 to about 9).